DOCUMENT RESUME

ED 180 439 IR 007 906

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TITLE Visual Literacy and the Brain.
PUB DATE Apr 77
NOTE 14p.; Paper presented at the National Conventtion of the Association for Educational Communications and Technology (Miami Beach, FL, April 25-29, 1977)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes: Educational Research: *Lateral Dominance: *Psychological Studies; Recall (Psychological): *Taxonomy: *Visual Literacy

ABSTRACT

This paper synthesizes the implications from hemispheric lateralization studies with the concerns and potentials of visual literacy. An overview of hemispheric lateralization research is provided, including summaries of four illustrative studies: Galin and Ornstein: Levy, Trevarthen, and Sperry: Zaidel: and Molfese. The appositional and holistic nature of right hemispheric processing is discussed with regard to the potentials of instruction and learning in art, music, and visual literacy. The need for specification of appositional learning outcomes of visual literacy programs is stressed, resulting in a tentative taxonomy of learning outcomes which seem consistent with visual literacy purposes and hemispheric lateralization research insights. (Author)

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VISUAL LITERACY AND THE BRAIN

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April, 1977

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Presented at the 1977 National Convention of the Association for Educational Communications and Technoloy, Miami Beach, Florida, April 25-29, 1977

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IR000790

A widely held and frequently published rationale for visual literacy rests upon belief that the work in hemispheric lateralization (or "split-brain" research) has uncovered knowledge on human capacities which visual literacy work in schools can foster. More specifically, that recently discovered right-hemisphere functions or aptitudes represent things which schools neglect and visual literacy programs can provide. It is the purpose of this paper to briefly explore the status of that relationship.

This paper will not attempt a review of hemispheric lateralization research, partly because a good review of this area would require far more space and time than is available here; and furthermore, because reviews and compilations exist to serve that function for those who are interested (see, for example, the UCLA Educator special issue on Lateralization of the Brain, 1975, and Human Behavior, June, 1976). For those who need an overview of what sorts of studies have been conducted in this area, however, a few illustrative studies were selected and are reported here in abstract form.

1. Galin and Ornstein monitored alpha wave activity of normal test subjects who performed tasks of (1) writing a letter, and (2) arranging blocks into a pattern. They found that increased alpha (less conscious activity) was measured from the right temporal lobe when writing a letter and

increased alpha was measured from the left side when arranging blocks. In other words, the left brain was "in charge" during the letter-writing task and the right brain during the visual-spatial task of pattern-making. (Galin and Ornstein, 1972)

2. Levy, Trevarthen and Sperry constructed split photographs, in which the left half of a photograph of a person's face was spliced to the right half of a photograph of a very different-looking face. Split brain subjects (persons who, for treatment of severe epilepsy, had previously undergone a severing of the nerve bundle, the corpus callosum, which interconnects the left and right frontal hemispheres of the brain) were shown the pictures in a controlled fashion so that the left eye (right hemisphere) saw only the left half of the picture and the right eye (left hemisphere) saw only the right half of the picture (the pictures were shown very close to the subject and flashed using a tachistiscope for a fraction of a second). When asked to say or describe what they saw, subjects would describe what the right eye (left brain) saw; when asked to point to what they saw, given a choice between the two whole versions which made up the picture presented, subjects consistently pointed to what the left eye (right brain) saw. When asked if they had noticed anything unusual about the split pictures they had seen, the subjects reported that they noticed nothing unusual at all. (Levy, Trevarthen, and Sperry, 1972)

3. Using an invention by Zaidel, the "Z-lens", experiments were enabled in which subjects' viewing of images could be controlled through a special contact lens and other optical equipment, such that light could be focused only on that part of the retina which relays information to one or the other hemisphere. Using this equipment with split-brain subjects, researchers were able to present less severly-limited material for longer periods of time; such as scanning many pictures as opposed to one split-picture or reading a whole paragraph as opposed to two words. The researchers administered standard language tests to each hemisphere separately (using the Z-lens) and in a third administration to both hemispheres jointly (without the Z-lens). The right hemisphere tended to have knowledge of syntax at approximately the same level as an average five-year-old, yet its vocabulary was that of a fourteen-year-old.

When right handed split-brain subjects were asked in writing (presented to the right brain only, using the Z-lens) to write their name and address, they were able to laboriously do so with the left hand. When the researcher orally asked the subject what he had done, the subject's reply was that he had no idea what he had done. However, when given a visual multiple choice of four pictures, one of which was of a person writing, the subject would point to that picture. (Zaidel and Sperry, 1973; Zaidel, 1973)

4. In these studies, Molfese measured differential response between hemispheres to a musical tone as compared to synthetically produced speech syllables ("gae" and "ae"). Using the electroencephlograph (EEG) for monitoring response, the stimuli were presented to infants less than 48 hours after birth. In the infants, the left hemisphere responded more strongly to the speech syllables and the right hemisphere responded more strongly to the non-speech sounds. (Molfese, 1973)

While some interpreters have stated that the right brain is predominately "visual" in preference or aptitude and that the left is "verbal", this is not the best conclusion which can be drawn from the research. The differences in hemispheric function in the brain are not quite as clear-cut as that, in the first place, yet real and sometimes startling differences do appear to exist between the potentialities or preferences of the two hemispheres of the brain. Ornstein characterizes the functions as <u>holistic/simultaneous</u> for the right hemisphere, and <u>analytic/sequential</u> for the left. Bogen considers the difference to be primarily that between <u>appositional</u> ideation (such memories and ideas as faces, spaces, images and musical timbre) for the right hemisphere, and <u>propositional</u> ideation (such as speaking, reading, calculating, and musical tempo) for the left.

With regard to the visual-verbal dichotomy, it seems obvious that there are simultaneous/appositional facets to some aspects of verbal languaging, as seen in poetry,

metaphor, and some forms of story-telling; and that there are propositional/sequential aspects to some of visual languaging, as in the selection or reading of a pictorial sequence.

A primary question, it seems to me, which consideration of visual literacy from a hemispheric lateralization standpoint generates is this: what sorts of "right-brain" capacities can be fostered with what kinds of visual literacy activities? The question is put in that direction, as opposed to an equally applicable one directed at the left brain capacities due to the notion that it is the right hemisphere which is the comparatively neglected of the two in the majority of school work, and due to the fact that "right-brain development" is that which is so frequently associated with visual literacy as a rationale. While the whole question must ultimately be addressed -- what are we doing for the whole person -- the effort directed toward the neglected half of the brain might represent ground-breaking in the ultimate interest of the whole.

Before positing any approaches or suggestions for the question at hand, it might be well to point out that, from my experience in reading and talking with researchers in hemispheric lateralization, particularly in talking with Robert Ornstein and Jeannine Herron, it would appear that they, first,have either not heard of "visual literacy" or are not interested or impressed enough to admit it, and second, that they seem to have greater interest in the utility of music and fable than visual language development

as means toward right hemisphere development. Whether this is from ignorance of the potential of visual literacy or from knowledge and conscious, reasoned rejection of it, I do not know.

Returning now to the question of right brain capacities and visual literacy, it would seem to me that the major emphasis of too much of the work done in visual literacy misses the potential for development which is sometimes ascribed to it. Perhaps this should only be surprizing, however, if it were in fact not the case. Our programs have been developed by us: predominately left-brained folks, by and large. Furthermore, the mainstream of theory undergirding visual literacy is language development. A great tradition exists in language arts teaching in the fostering of sequential and analytic language skills, although an equally great tradition exists in the more holistic experiences of poetry. I believe that, between the two traditions, we frequently opt for visual literacy activities which are extensions of the more technical, left-hemispheric expression and communication models of the language development theorist. We sometimes do this at the unnecessary expense of poetic and artistic potentialities which are available and appropriate.

Considering art and music for a moment, I would like to illustrate where both they and, indirectly, visual literacy might do more with regard to right-brain development. For argument's sake, let me characterize the emphasis of school work in art to be directed toward an

understanding of what is in given works of art and a control over intended outcome of what is to be in creation, with the objective of the esthetic (the pleasing and beautiful) as the guiding force. For an art class to not pursue beauty is to remove it, I would think, from the domain of art. So, while the work may be expressive, it is often quite technical with regard to beauty -- where beauty is and how you get it. There is in the product-centered goal orientation of too many art classes, a loss of the divergent, non-linear character of right-brain processing. In the same vein, in music studies, the mastery of fundamental music skills and knowledges necessary to play an instrument or to sing well enough for the demanded performances seems to be left-brain work with a vengeance.

I am not suggesting that art teachers give up art, music teachers foster incompetence in music, or that visual literacy folks neglect visual literacy. I am suggesting that in each of these areas there lie important potentials in fostering what now appears to be a neglected aspect of human learning and development. I support an interdisciplinary perspective which combines technical aspects of activities contolled by the left hemisphere, with holistic and appositional aspects of right-brain learning activities. The envisioned outcome will not be a switch from one extreme to the other (left-to right-brain centered education), but a meaningful, positive combination , using both hemispheres to the student's

advantage, thus providing a complete creative and aesthetic learning experience.

What, then, might represent some approaches to learning which we might emulate or take as models, given the perspectives from hemispheric lateralization research and its implications? Are there any activities which, within the argument frame I have set up, can be observed which would constitute right-brain assistance for a whole brain education? About the best I can come up with, especially when attempting to bear in mind our common interest in visual literacy, is something I have some difficulty in defining. I have in mind, however, the non-school, generally not-formally-organized efforts of people who are expressing themselves in creative ways who don't give a hoot about what people think of their work. The activities of people working and playing with guerrilla television and underground film seem to frequently fit the concept with some adequacy.

Is it possible to do a rigorous job of specification of visual literacy activities and outcomes for a goal which is as fundamentally holistic, gestalt, and open as right-brain education? At first glance, to do so might appear a contradiction in terms. Yet I do not believe this to necessarily be the case and would stress the need for clear definition and specification of what we want. When right-brain development is the question, visual literacy can provide a highly appropriate vehicle: the visual world.

But the outcomes of visual language development are not, as best I can tell, centrally or exclusively right-brain outcomes. The visual appreciations, skills and language development outcomes of visual literacy programs can go on either with or without right brain development as a concurrent outcome. Our task, then, if we are interested in this half of the brain, is to precisely identify what uniquely beneficial kinds of experiences in visual literacy can promote holistic, appositional thinking.

An effort in this direction, submitted to you partly as example and partly for its own sake, follows. I have attempted to generate a taxonomy or learning-development hierarchy from the cross-over standpoint of right-brain learning and development and visual literacy. What follows is, in a sense, a first-draft version. Should this taxonomy or even certain aspects of it generate interest and stand up to your close examination and criticism, it may provide a beginning point for refinement and, very importantly, validation in school settings as a validated learning-development hierarchy in this area.

A TAXONOMY OF RIGHT-BRAIN VISUAL LITERACY OUTCOMES

A. Primary Visual/Spatial Experiences: preschool through first grade, approx.

1. Manipulation: activities and outcomes such as:
   -holding, touching, and changing objects in the environment, both commonplace and unusual.

2. Construction: activities and outcomes such as:
   -drawings, paintings, making simple constructions, as in paste and cut-out paper creations.

3. Abstractions: activities and outcomes such as:
   -identification and learning of defined physical concepts such as "triangle-ness," long, short, etc.

B. Skilled Visual/Spatial Capabilities: second through sixth grade, approx.

1. Manipulation: activities and outcomes such as:
   -tool using in complex, concrete visual-spatial problems, as in mechanical constructions (Leggo, Erector, etc.) and repairs (take a clock apart and put it back together).
   -taking and using (sequencing) photographs.

2. Construction: activities and outcomes such as:
   -drawing with perspective from objects present.
   -controlling visual variables in photographic processing.
   -Origami and related advanced constructions.

3. Abstractions: activities and outcomes such as:
   -creation of visual plan/patterns in two dimensions.
   -specifying photographic treatment for individual and sequences of physical objects and actions.

C. Holistic/Appositional Visual Outcomes: sixth grade (approx.) and on.

1. Manipulation: activities and outcomes such as:
   -ability to mentally manipulate multiple visual fields and representations, as in visualizing multivariate statistical models.

2. Construction: activities and outcomes such as:
   -ability to draw in three dimensions immagined objects and original conceptualizations of high visual complexity.
   -possession of one's own original photographic style.

3. Abstractions: activities and outcomes such as:
   -multiple holistic appositional forms of abstract thought; lateral thinking; visual intuition; unique visual invention; etc.

In conclusion, I would like to emphasize that specification of visual literacy activities and outcomes for right-brain education need not be performed with an adversary orientation regarding other sorts of outcomes...those which are generated from a left-brain perspective and those which are generated from perspectives completely outside the hemispheric lateralization frame. Just as the whole brain and person are the ultimate concern in educational implications of hemispheric lateralization, the whole of visual literacy can and should draw upon perceptions and directions established by many fields of thought.

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